UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/778,254	02/07/2001	Leonard Joseph Cimini JR.	2000-0192	6370

7590 06/03/2004		**EXAMINER**

Samuel H. Dworetsky
AT&T CORP.
P.O. Box 4110
Middletown, NJ 07748-4110

EXAMINER
NGUYEN, ALAN V

ART UNIT	PAPER NUMBER
2662	

DATE MAILED: 06/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.		Applicant(s)
Office Action Summary	09/778,254		CIMINI ET AL.
	Examiner		**Art Unit**
	Alan Nguyen		2662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.
2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-19_ is/are pending in the application.
   4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _1-19_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on _17 September 2001_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All   b) ☐ Some * c) ☐ None of:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. _____.
    3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
       application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _2_.
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2.   Claims 1-7, 11-13, and 15-18 are rejected under 35 U.S.C. 102(b) as being

anticipated by Müller et al ("A Novel Peak Power Reduction scheme for OFDM", The 8th

IEEE International Symposium, pages 1090-1094, September 1997) hereafter Müller.

Regarding **claims 1 and 11** Müller discloses a method of embedding PAP-reducing

inversion sequences onto transmitted data **(transmitting optimized transmit**

sequences; see section 4.1);

Müller discloses determining an initial PAP value for a block of symbols

(introduce complex rotation factors with b_u=1; for example see section 4.1);

Müller discloses partitioning the bock of symbols into a predetermined number of

clusters **(partitioned into V pairwise disjoint blocks. Since partitioning of the block**

is one prior to computation, V is understood to be determined prior to the PAP

reduction computation; section 4.1);

Müller discloses selecting a respective phase factor for each of the clusters so as

to form an inversion sequence **(optimized transmit sequence)** that reduces a PAP of

transmitted data corresponding to the block of symbols **(the number set {±1, ±j} are**

used as phase factors to form the inversion sequence of each sub-block that has

the optimized values; see section 4.1 and 4.3); and

Müller discloses embedding the inversion sequence onto the transmitted data by

rotating selected tones in each of the clusters based upon a value of the associated

phase factor **(Rotation of all subcarriers in sub-blocks $v=(1...V)$ to find the**

optimum transmit sequence. The sequence is then embedded and transmitted as

shown in figure 1, see elements "$b_u(v)$" and "peak value optimization" and

section 4.1).

Regarding **claim 2** Müller discloses rotating at least one tone in a first one of the

plurality of clusters when the corresponding phase factor rotates the first one of the

plurality of clusters **(all subcarriers in sub-blocks $v=(1...V)$ are rotated; see section**

4.1).

Regarding **claims 3 and 16** Müller discloses rotating every other tone in each cluster

having an associated phase factor that rotates the cluster **(Rotation of all sub-carriers**

in sub-blocks $v=(1...V)$; see section 4.1).

Regarding **claims 4 and 15** Müller discloses where the phase factors are binary

(Müller's embodiment does use the values {±1}; section 4.3).

Regarding **claims 5 and 17** Müller discloses detecting the inversion sequence **(the set consisting of all optimum rotation factors has to be transmitted to the receiver so that the subcarriers can be rotated back appropriately; see section 4.2)**.

Regarding **claims 6, 7, and 18** Müller discloses computing a test statistic for each cluster **(computational efficient DFT algorithms and optimization of sub-blocks; see sections 4.3 and 4.4)**.

Regarding **claim 12** Müller discloses employing an iterative process to determine the phase factors **(the process goes through a plurality of phase factor values and determines the optimal value from said plurality of values. It must go through an iterative sequence to determine that optimal value; see section 4.1)**.

Regarding **claim 13** Müller discloses approximating an optimal inversion sequence **(perform a peak value optimization for the transmit signal to result in an optimum transmit sequence; see section 4.1)**.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 8, 9, 14, and 19 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Müller in view Sarkar (US 6,363,060).

Regarding **claims 8, 9, 14 and 19** Müller discloses decoding the inversion

sequence **the set consisting of all optimum rotation factors has to be transmitted**

to the receiver so that the subcarriers can be rotated back appropriately; see

section 4.2).

Müller, however, fails to expressly disclose decoding the inversion sequence to a

nearest Walsh sequence based upon Hamming distance.

Sarkar discloses a communications transmission system that optimizes data

transmission efficiency by measuring the Hamming distance as a validity test of the

data. The Hamming distance is a type of Walsh sequence **(see column 9 lines 20-30).**

It would have been obvious to one having ordinary skill in the art at the time the

invention was made to modify Müller's embodiment to utilize the Hamming distance, as

taught by Sarkar. The motivation is an improvement in data efficiency that Müller

stresses, and it is widely known that Walsh sequences and Hamming values are used

as error correction methods in frequency division multiplexing schemes, as taught by

Sarkar on column 5 lines 37-42.

5.   Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Müller in

view of Friedlander et al (US 6,501,747) hereafter Friedlander.

Regarding **claim 10** Müller discloses decoding the inversion sequence **the set consisting of all optimum rotation factors has to be transmitted to the receiver so that the subcarriers can be rotated back appropriately; see section 4.2).**

Müller, however, fails to expressly disclose decoding the inversion sequence to a nearest Walsh sequence based upon Euclidean distance.

Friedlander discloses a data modulation scheme that utilizes the measurement of the Euclidean distance **(see column 7 lines 30-37).**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Müller's embodiment to utilize the Euclidean distance, as taught by Friedlander. The motivation is an improvement in data efficiency that Müller stresses, and it is well known by one skilled in the art that the Euclidean distance is an important measurement used to improve data efficiency in frequency division multiplexing schemes, as explained by Friedlander on column 6 lines 14-22.

Conclusion

6.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to show the state of the art with respect to reduction of peak-to-average power ratios in OFDM systems:

US Patent (6,125,103) to Bäuml et al

US Patent (6,314,146) to Tellado et al

US Patent (6,175,551) to Awater et al

> IEEE article to Lawrey et al
>
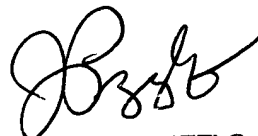> IEEE article to Zekri et al
>
> IEEE article to Goeckel et al

7.   Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Alan Nguyen whose telephone number is 703-305-0369.
The examiner can normally be reached on 9am-6pm ET, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, Hassan Kizou can be reached on 703-305-4744. The fax phone number for
the organization where this application or proceeding is assigned is 703-872-9314.

Information regarding the status of an application may be obtained from the
Patent Application Information Retrieval (PAIR) system. Status information for
published applications may be obtained from either Private PAIR or Public PAIR.
Status information for unpublished applications is available through Private PAIR only.
For more information about the PAIR system, see http://pair-direct.uspto.gov. Should
you have questions on access to the Private PAIR system, contact the Electronic
Business Center (EBC) at 866-217-9197 (toll-free).

AVN
May 25, 2004

JOHN PEZZLO
PRIMARY EXAMINER